

REMARKS

Claims 2-6 and 8-12 remain pending in the application.

Claim Rejections—35 U.S.C. § 103

Claims 2-4, 6 and 8-11 stand rejected under 35 U.S.C. § 103 as being unpatentable over Kalivas et al. ("Motion Compensated Enhancement of Noisy Image Sequences") in view of Prakash et al. (International Publication 00/64167).

Claims 5 and 12 stand rejected under 35 U.S.C. § 103 as being unpatentable over Kalivas et al. in view of Prakash et al. and further in view of Golin.

Both these rejections rely on Kalivas et al. in view of Prakash et al. Applicants respectfully traverse both these rejections.

A. Claims 2-6 and 8-12

Claim 2 recites as follows.

2. A method for temporally filtering a video sequence, the method comprising:

using object motion estimation for arbitrarily shaped segments to align corresponding pixels between at least two frames;

determining segments that are no longer adjacent to a segment boundary based on said object motion estimation;

reducing impact of color blur from said segments that are no longer adjacent by adjusting weights assigned to one or more frames for pixels that lie within a blur region near said segment boundary; and

computing a weighted average of color values of said corresponding pixels.

(Emphasis added.)

As shown above, the third element of claim 2 recites "**reducing impact of color blur from said segments that are no longer adjacent by adjusting weights assigned to one or more frames for pixels that lie within a blur region near said segment boundary.**"

The advisory action of September 22, 2008 states, "**Prakash was not relied on to teach adjusting pixel weights.** Instead, pages 4-5 of the Final Rejection of 18 July 2008 states that **this limitation was mapped with section 4.2 of the Kalivas reference.**" (Emphasis added.) The advisory action further states, "The Prakash reference was instead cited to demonstrate the motivation of a person having ordinary skill in the art at the time the invention was made to use the claimed 'arbitrarily shaped segments' for motion estimation rather than block-based segmentation."

Given the above statements by the Examiner, the applicants' current understanding is that the Examiner is applying Prakash as being relevant to the first element ("using object motion estimation for arbitrarily shaped segments ...") of claim 2, not the third element ("reducing impact of color blur ..."). Rather, the Examiner is rejecting the third element based solely, or at least primarily, on the Kalivas reference. If this understanding is incorrect, applicants respectfully request a clarification from the Examiner.

In regard to section 4.2 ("Spatiotemporal Mean Filtering") of the Kalivas reference, applicants hereby reproduce this section, in its entirety, for convenience of reference.

4.2 Spatiotemporal Filtering

A motion compensated spatiotemporal filter is defined by

$$\hat{f}(i, j, k) = ST_{MC}\{g(x_n, v_n, n); \hat{\lambda}(x_n, y_n, n); \hat{C}(n); \hat{\alpha}(n); n \in T; (x_n, v_n) \in W_n\} \quad (15)$$

where the subscript *MC* means Motion Compensated, *T* is a time window containing *k* and *W_n* is a spatial window containing (x_n, y_n) .

Spatiotemporal Mean Filtering

We assume that *T* has length $2M + 1$ and is centered at *k*. *W_n* is spatial window centered at (i_n, j_n) which is the closest pixel to (x_n, y_n) . The spatiotemporal mean filter is given by

$$\hat{f}(i, j, k) = \frac{1}{L} \sum_{n=k-M}^{n=k+M} \sum_{(l,m) \in W_n} g(l, m, n) \lambda(l, m, n) \quad (16)$$

where

$$L = \sum_{n=k-M}^{n=k+M} \sum_{(l,m) \in W_n} \lambda(l, m, n).$$

Spatiotemporal Median Filtering

The spatiotemporal median filter is given by

$$\hat{f}(i, j, k) = \text{MEDIAN}\{g(x_n, v_n, n); n \in [k - M, k + M]; (x_n, v_n) \in W_n\} \quad (17)$$

The above section 4.2 of Kalivas is a very generalized discussion of spatiotemporal filtering. Applicants respectfully fail to see how section 4.2 of Kalivas reads upon the element of **"reducing impact of color blur from said segments that are no longer adjacent by adjusting weights assigned to one or more frames for pixels that lie within a blur region near said segment boundary"** in claim 2.

First, there is no disclosure in Kalivas of "reducing the impact of color blur from segments that are no longer adjacent." In fact, there appears no mention of color blur in Kalivas, nor does Kalivas mention segments that are no longer adjacent.

Second, there is no disclosure in Kalivas of achieving such reduced color blur “by adjusting weights assigned to one or more frames for pixels that lie within a blur region near said segment boundary.” In fact, segment boundaries do not appear to be mentioned in Kalivas, nor does Kalivas mention blur regions near segment boundaries.

Therefore, applicants respectfully submit that claim 2 clearly overcomes its rejection.

If this rejection is maintained by the Examiner, applicants respectfully request a clear and detailed explanation as to how each limitation of claim 2 is disclosed or suggested by the cited references. Applicants respectfully submit that such a clear and detailed explanation is required to make a *prima facie* case for rejecting claim 2 based on obviousness.

Claims 3-5 depend from claim 2. The citation to Golin does not cure the above-discussed deficiencies in the rejection of claim 2. Therefore, applicants respectfully submit that dependent claims 3-5 are patentable for at least the reasons discussed above in relation to claim 2.

Previously-presented claim 6 recites similar limitations as claim 2. In particular, claim 6 recites that **“weights assigned to one or more frames are adjusted for pixels that lie within a blur region near said segment boundary to reduce impact of color blur from said segments that are no longer adjacent to said segment boundary.”** (Emphasis added.) Therefore, applicants respectfully submit that the rejection of claim 6 is overcome for at least the reasons discussed above in relation to claim 2.

Previously-presented claim 8 also recites similar limitations as claim 2. In particular, claim 8 recites, **“adjusting weights used to calculate the weighted average for pixels that are no longer adjacent in order to compensate for blur transitions near object boundaries due to temporal changes in said previously adjacent objects.”** (Emphasis added.) Therefore, applicants respectfully submit that claim 8 is patentable for similar reasons as discussed above in relation to claim 2.

Claims 9-12 depend from claim 8. Therefore, applicants respectfully submit that dependent claims 9-12 are patentable for at least the reasons discussed above in relation to claim 8.

B. Claims 4 and 11

In rejecting claims 4 and 11, the final rejection of July 18, 2008 stated, "Kalivas et al. and Prakash et al. are silent regarding Group of Picture (GOP) structure. However, the examiner takes **Official Notice** that the limitation of 'determining additional motion information across GOP boundaries' is a well-known part of the MPEG standard." (Emphasis added.) This Official Notice was respectfully traversed by the applicants as improper in the response to office action filed on September 4, 2008.

The advisory action of September 22, 2008 provides a quotation from page 273 of a **Waggoner** reference, published August 2002, a bit more than a year prior to the present application's filing date of December 3, 2003. Applicants thank the Examiner for citing this specific reference.

The citation to Waggoner discussion "Open and Closed GOPs" and states, "In a Closed GOP, no frame can reference any frame in any other GOP. In an Open GOP, they can. ... In a closed GOP, the last B frames can only reference the P-frame before them. In an Open GOP, they can reference the first I-frame of the next GOP, improving their quality." In other words, **Waggoner merely discloses that, for Open GOPs, a frame can reference a frame in another GOP.**

In contrast, claim 4 recites, "**determining additional motion information across GOP boundaries** to allow filtering across these boundaries." (Emphasis added.) Hence, claim 4 expressly recites that additional **motion** information is determined across GOP boundaries.

Applicants respectfully submit that "determining additional motion information across GOP boundaries to allow filtering across these boundaries" is an entirely different step than merely "referencing" a frame in another GOP under

an Open GOP. Applicants respectfully fail to see how the citation to the Waggoner reference discloses the limitation of claim 4.

Similarly, claim 11 recites, “wherein the **estimation of motion** is between frames that are across a group of pictures (GOP) type boundary which does not involve a scene change.” (Emphasis added.) Hence, claim 11 expressly recites motion estimation between frames that are across a GOP type boundary.

Applicants respectfully submit that the mere “referencing” of a frame across a GOP boundary per Waggoner does not disclose **motion estimation** between frames that are across a GOP type boundary. Applicants respectfully fail to see how Waggoner discloses the limitation of claim 11.

If this rejection is maintained by the Examiner, applicants respectfully request a clear and detailed explanation as to how the limitations of claims 4 and 11 are disclosed or suggested by the cited references. Applicants respectfully submit that such a clear and detailed explanation is required to make a *prima facie* case for rejecting claims 4 and 11 based on obviousness.

Conclusion

For the above discussed reasons, applicants respectfully submit that the claims are shown to be patentable over the cited art and in form for allowance.

The Examiner is invited to call the undersigned for any questions.
Favorable action is respectfully solicited.

Respectfully submitted,

Dated: October 18, 2008 By: /James K. Okamoto, Reg. #40110/
James K. Okamoto
Attorney For Applicant(s)
Reg. No. 40,110
OKAMOTO & BENEDICTO LLP
P.O. Box 641330
San Jose, California 95164
(408) 436-2110
(408) 436-2114 (FAX)

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